

Systemic Effects of Periodontal Therapy

Moritz Kebschull

There is evidence that (i) periodontitis is an independent risk for atherosclerosis, (ii) early atherosclerosis is mediated by activation of vascular endothelial cells, (iii) inflammatory mediators capable of endothelial activation are associated with the extent and severity of periodontal disease, and (iv) vascular endothelial function, as measured by endothelium-dependent vasodilation, can be improved by periodontal treatment. Indirect measures of endothelial function – as the abovementioned endothelium-dependent vasodilation - are not suitable for studying mechanisms underlying the pathobiology of atherogenesis.

We hypothesize that the systemic anti-inflammatory/anti-atherogenic effects of periodontal therapy in patients with severe periodontitis are directly manifested through changes in gene and protein expression in vascular endothelial cells. To understand the mechanisms underlying the positive modulation of systemic inflammation achieved by periodontal therapy, we propose to utilize a novel, minimal-invasive endothelial sampling and whole-genome expression profiling method to investigate differences in vascular endothelial cell gene expression both longitudinally and cross-sectionally. In a pilot study, we will harvest endothelial cells from the forearm veins of five patients with severe periodontitis, a week before and four weeks after completion of comprehensive periodontal therapy, and of five periodontally healthy controls using J-shaped vascular guide wires. A portion of the obtained endothelial cells will be purified using magnetic beads, total RNA will be isolated, amplified, biotin-labeled, fragmented and hybridized to Affymetrix U133 Plus 2.0 microarrays. The gene expression data will be independently confirmed on the protein level using quantitative immunofluorescence, using the remaining portion of the samples.

This pilot study will guide us in the design of a larger scale study which will focus on the molecular events that initiate, sustain, moderate, and resolve vascular inflammation in the context of periodontal disease and therapy.